Panel 1

Welcome Dach - Remainder when we left:

Limb. it |x-c|cd = |1|(1-c|cc
it |xn-sc den f(xn|-)|

Continuity: lain 1(x) = 1(limx) o f(c)

Uni form continuities - remaile

Framp

escentials

(Monotone handons can have at most countible many
duc., no estentials.

Topology and Continuity

f is continuous iff f (1) is gran if U is ope

I'(C) a closed if C is about.

Note: If C is compact => f (C)

If U is closed: f (U)

If U is closed: f (U) and we closed

If U is bold: f (U) not now hold.

Panel 2

Panel 3

Min /Max Theorem: footh on compact set Co f has

unax + unix

Pract. I(C) in compact of sup (I(x), xcC) exist (because the

lind exists

=> sup, in A & f(C) because to down

Johanno's Theorem: If it is cont. on (a,5) and

f(a) I(5) < 0, in I(c), f(6) hum dilbord signs, then ICE(a,5)

s.t. I(c) = O

Pools f(a,6) in connected, contains (I(a), I(b)). I(a) I(b) <0

=> O & (I(a), I(b)) => I c st. I(c) = 0

Ex p(x) = a x + a x + 1 - + a x + a o, & odd

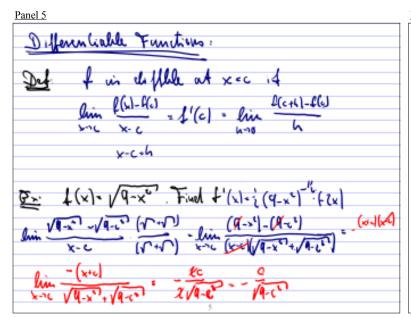
=> p(x) = 0 for at least one solution

lim p(x) = sign(an) to , lim p(x) - sign(an) to

x > a x and p(x) > 10 } x and p(x) < -10 f

Intermediate Value There

Has a sign of the contract of the



This def. hums out to up be that well for

during sethings, e.g. in R or R or R.

L(x)-1(c) = chirina does not worked

L(x)-1(c) = f(c) -> f(x) = f(c)(x-c)+1(c)

Thus I defined on (a,5) in diffile at x=c if

3 countered M s.t.

f(x) = f(c)+M(x-c)+r(x)

where $\lim_{x\to c} \frac{r(x)}{|x-c|} = 0$ Chas is f'=M

Panel 6

Theorem 6.5.7: Algebra with Derivatives

 Addition Rule: If f and g are differentiable at x = c then f(x) + g(x) is differentiable at x = c, and

$$o \frac{d}{dx} (f(x) + g(x)) = f(x) + g'(x)$$

Product Rule: If f and g are differentiable at x = c then f(x) g(x) is differentiable at = c, and

$$o \frac{d}{dx} (f(x) g(x)) = f(x) g(x) + f(x) g'(x)$$

Quotient Rule: If f and g are differentiable at x = c, and g(c) # 0 then then f(x) / g(x is differentiable at x = c, and

$$\frac{d}{dx} (f(x) / g(x)) = \frac{f'(x)g(x) - f(x)g'(x)}{[g(x)]^2}$$

Chain Rule: If g is differentiable at x = c, and f is differentiable at x = g(c) then
f(g(x)) is differentiable at x = c, and

$$\circ \frac{d}{dx} f(g(x)) = f(g(x)) g'(x)$$

Panel 8

Show that
$$f(x) = \sqrt{q+x}$$
 is diffshe at $c=0$ using the linear approx. def. $f'(s) = \frac{1}{6}(4+x)^{-6}$

$$f(x) \approx f'(c)(x-c)\cdot f(c) = \frac{1}{6}x+3$$

$$\sqrt{q+x} = \frac{1}{7}x + r(x)$$

$$\Rightarrow r(x) = \sqrt{q+x} - \frac{1}{7}x + r(x)$$
New $\lim_{x\to 0} \frac{r(x)}{x} = 0$

$$\sqrt{q+x} - \frac{1}{7}x + r(x)$$

$$\sqrt{q+x} - \frac{1}{7}x + r(x)$$

$$\sqrt{q+x} - \frac{1}{7}x + r(x)$$

$$\frac{\sqrt{q+x} - \frac{1}{7}x + r(x)}{x} = 0$$

